

## REMARKS

The Office Action dated April 3, 2001, has been carefully reviewed and the foregoing amendments to the application have been made in consequence thereof.

Claims 2-16 and 18-20 have been canceled in order to advance the prosecution of this application. Claims 1 and 17 remain active in this application. Claims 1 and 17 have been amended to include storing information for describing the condition of a product and to include indicia means located at each comparator stage for correlating a stage with the information describing the condition of the product at a particular stage.

The Examiner rejected Claims 1-20 under 35 U.S.C. 102(b) as being anticipated by Hof et al., Kang et al., Allmendinger, Prusik et al., Baum, Olsen et al., Baughman et al., or Taoukis et al., which the Examiner states all teach time-temperature indicators, for monitoring the shelf life of food and a color comparison chart to indicate the time/temperature history of the food, and indicators with a plurality of comparator stages located on a support member.

✓ Hof et al. disclose a temperature indicating device comprising a flat or gradually curved heat-conducting carrier having one or more regions, preferably cavities, wherein each region or cavity corresponds to a particular temperature. In one embodiment, each cavity has a thermally responsive composition that respond to a particular temperature. In another embodiment, an indicator means is located at the bottom of each cavity. Claim 11 in column 114, line 62 states....”change the color of the composition visible to the naked eye...”. The device taught by Hof et al. teaches a temperature indicator but not a time-temperature indicator. Hof et al. do not disclose the TTI comparator configuration of the present invention.

✓ Kang et al. disclose a time temperature indicator device comprising a porous substrate, a layer or strip of electrochromic material disposed on the substrate and an electrode in contact with one end of the strip of electrochromic material so that there is a localized area of communication between the electrode and the strip of electrochromic material. An electrolyte contacts both the layer of electrochromic material and the electrode and the whole device is encapsulated within a transparent polymer sheath. The device may be applied very much like a label to the wrapping or container of a product and may be provided with a calibration scale to indicate the state of the product as a result of its time-temperature history. The patent discloses that one way of doing this is to mark the device with green, amber and red areas (see Fig. 2) wherein the green area indicates the product is fresh, the amber area indicates the product should be used in the near future and the red area indicates that the product may have passed its “sell-by” date and may be unsatisfactory. Thus, for example when the color change boundary moves into the green area, the product is fresh. This patent teaches a TTI but does not teach a TTI comparator; and does not teach a comparator configuration as disclosed by the present invention. Specifically, this patent does not disclose a TTI comparator that comprises a plurality of stages, wherein each stage has a peripheral area that has a fixed reference color an inner area within the peripheral area that has a color that corresponds to a specific time-temperature condition (or storage condition) of a product, indicia correlating to information describing the condition, and means for storing and accessing the information.

✓  
Allmendinger discloses an indicator that provides time/temperature integrated indication of the temperature history of a frozen product through the diffusion of water along a cellulose wick. The cellulose wick is provided on itself with a water soluble, hydrate forming substance. The wick is covered in a plastic covering with an opening in the covering exposing the wick to water at the product. The advance of the water front along the wick is indicated by a time/temperature indicator adjacent the wick and/or by an acid/base indicator on the wick and spaced from the indicator. The indicator uses a logarithmic time scale that is related to the remaining durability of the product to be monitored at a specific temperature. Allmendinger does not disclose, the TTI comparator configuration as disclosed by the present invention.

Prusik et al. disclose a multifunctional time-temperature indicator device that comprises the combination of two indicating systems: (i) a primary indicator that develops a color change as a result of cumulative time-temperature exposure and (ii) a threshold second indicator. The device provides a human readable signal that gradually and irreversibly develops color as a function of time and temperature. This patent discloses that the multifunctional time-temperature indicator described therein more closely monitors the actual condition of a deteriorative product than does a single indicator. This patent does not teach the TTI comparator configuration as disclosed by the present invention.

✓  
Baum discloses a thermally sensitive record material system. Data is generated on a record medium in response to an application of heat. The record medium is capable of generating data images in more than one color by exposing the medium to more than one temperature level in the areas to be imaged. This patent does not disclose the TTI comparator configuration as disclosed by the present invention.

Olsen et al. teach a time-temperature indicator, the color of which is used as a measurement by comparison with a standard color chart. This teaching does not disclose a comparator having indicia, information corresponding to the indicia, and means for storing and accessing the information.

✓  
Baughman et al. teach a time-temperature recording device having a substrate and indicating units disclosing a color change, whereby the units comprise an acetylenic compound. This device does not show a comparator described by the present invention.

Taoukis et al. described a variety of time-temperature indicators, but do not describe a comparator for determining the significance of the indication shown on an indicator.

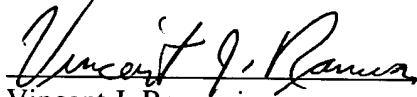
In view of the foregoing amendments and remarks, it is believed that Claims 1 and 17 in this application are allowable and Notice to that effect is respectfully solicited.

It is intended and hoped that this Preliminary Amendment will narrow the issues on further prosecution and render further prosecution more expedient.

Should the Examiner wish to contact Applicant attorney regarding this application, the Examiner is respectfully invited to do so by calling or writing the undersigned in the Office of Counsel, U.S. Army Soldier and Biological Chemical Command, Natick, MA 01760 at (508) 233-4510.

Respectfully submitted,

OCTOBER 3, 2001  
Date

  
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1. (Amended) A comparator for use with a time-temperature indicator, said indicator for external monitoring of time-temperature history of a product, the time-temperature indicator having an active portion having an initial color and which undergoes chemical changes as time elapses and at a rate related to the temperature of the surrounding environment wherein the chemical changes produce changes in the color of the active portion, the comparator comprising:

a supporting member; [and]

a plurality of comparator stages located on the support member, each comparator stage comprising a first portion having a reference color and a second portion having a predetermined color that is the same as one of the colors to which the active portion of the time-temperature indicator changes, the colors of the second portions of the comparator stages darkening in a progressive manner such that the predetermined color of the second portion of a first one of the comparator stages is substantially lighter than the reference color of the first stage and the predetermined color of the second portion of a last one of the comparator stages is substantially darker than the reference color of the last comparator stage;

information describing a condition of said product at each comparator stage; indicia

means located on the support member to facilitate identification of each stage,

said indicia means corresponding to a condition of said product at a said stage as described by the information; and

means for storing said information;

whereby a user of the comparator compares the color of the active portion of the time-temperature indicator to each comparator stage to determine if the color of the

active portion is the same as the color of the second portion of any of the comparator stages; and

whereby said user correlates the indicia of the stage, having the same color as said active portion, with said storing means for accessing information corresponding to the indicia for determining the condition of the product.

17. (Amended) A method of determining the time-temperature condition of a food product having applied thereto a time-temperature indicator, the indicator having an active portion having an initial color and which undergoes chemical changes as time elapses and at a rate related to the temperature of the surrounding environment wherein the chemical changes produces changes in color of the active portion, the method comprising the steps of:

- (a) providing a comparator comprising support member, and a plurality of comparator stages located on the support member, each comparator stage comprising a first portion having a reference color and a second portion having a predetermined color that is the same as one of the colors to which the active portion of the time-temperature indicator changes, the colors of the second portions of the comparator stages darkening in a progressive manner such that the predetermined color of the second portion of a first one of the comparator stages is substantially lighter than the reference color of the first stage and the predetermined color of the second portion of a last one of the comparator stages is substantially darker than the reference portion of the last comparator stage;
- (b) comparing the color of the active portion of the time-temperature indicator to the predetermined color of the second portion of each comparator stage;
- (c) selecting the comparator stage having the second portion with the predetermined color that matches the color of the active portion of the time-temperature indicator;  
[and]
- [(d) correlating the comparator stage selected in step (c) to a particular time-temperature condition.]

(d) storing information describing a condition of the product, each condition being identified by an indicia identifying the condition of the product at a particular stage;

(e) correlating the indicia of the selected comparator stage to a particular condition of the product; and

(f) retrieving said stored information describing the condition of the product at the selected comparator stage.